

REMARKS

In the Office Action, the Examiner rejected Claims 1, 2, 4-7, 9-12 and 14-21, which are all of the pending claims, over U.S. Patent 5,487,116 (Nakano, et al.). In particular, Claims 1, 2, 4-7, 9-12, 14, 15, 17, 19 and 21 were rejected under 35 U.S.C. §102 as being fully anticipated by Nakano, et al; and Claims 16, 18 and 20 were rejected under 35 U.S.C. §103 as being unpatentable over Nakano, et al.

Applicants herein request that independent Claims 1, 6 and 11 be amended to emphasize differences between the claims and the prior art. Applicants also ask that Claims 4 and 14 be amended to keep the language of these claims consistent with the language of Claims 1 and 11, respectively.

For reasons discussed below, Applicants respectfully submit that Claims 1, 2, 4-7, 9-12 and 14-21, as presented herewith, patentably distinguish over the prior art and are allowable. The Examiner is, thus, respectfully requested to enter this Amendment, to reconsider and to withdraw the above-identified rejections of Claims 1, 2, 4-7, 9-12 and 14-21, and to allow these claims.

This invention generally relates to methods and apparatus for measuring two-dimensional submicron structures or shapes formed by photolithography on semiconductor wafers. This is done by determining the edges of those structures or shapes. These shapes can have many specific forms, and the edges of the shapes can extend in various directions and change directions as the perimeters of the shapes are traversed.

In the invention, pixel intensity values are obtained along a plurality of scans extending in a plurality of different directions through substantially the same point in the vicinity of an edge of the image shape. Scans with sufficient contrast to contain edge

information are recognized, and those scans are subjected to an edge detection algorithm to detect the edge location. A locus of points that define the two-dimensional shape of the image is generated from the detected edge values.

Nakano, et al discloses a method and system for recognizing contours of a vehicle from road images taken by a pair of cameras mounted on another vehicle. In this method, an edge extraction procedure is used to extract edges from the road images, and an edge searching procedure is used to extract vehicle candidate regions from the road images.

There are a number of important general differences between the present invention and the method and system disclosed in Nakano, et al. One, very important difference is the difference in the sizes of the objects whose edges are determined – in Nakano, et al., the object is a vehicle, while in the present invention, the object is a submicron image.

Another important difference is that the shapes of the images detected with the Nakano, et al. system are comparatively regular, continuous shapes. In contrast, with the present invention, the image shapes include corners that are oriented at all angles from horizontal to vertical.

The above-discussed general differences between the present invention and the system disclosed in Nakano, et al. are reflected in a number of mores specific differences. For instance, with this invention, pixel intensity values are obtained along a plurality of scans extending in different directions through substantially the same point in the vicinity of an edge of the image shape, and then selected ones of these scans are subjected to an edge detection algorithm.

Nakano, et al. does not disclose the use of selected ones of these scans in this way. In columns 6-8, Nakano, et al. discloses the user of parallel scans and discloses the use of

pixel data to identify edges. Nakano, et al, does not, though, teach the principal of subjecting selected ones of a plurality of scans that are taken in different directions through substantially a common point, to identify the image edge.

Applicants ask that Claims 1, 6 and 11 be amended to emphasize this difference between the claims and the prior art. More specifically, these claims are being amended herein to indicate that certain recognized or identified scans, of a plurality of scans extending in different directions, are subjected to the edge detection algorithm.

This feature of the invention is useful because the use of these plurality of different direction scans helps to track an edge that may change direction or might be discontinuous. With Nakano, et al, the edge of the vehicle does not change in this way, and in particular, does not have discontinuities. In view of this, there is no motivation to change the Nakano, et al. procedure to use the plurality of different direction scans in the manner described in Claims 1,6 and 11 as amended herein.

The other references of record have been reviewed, and it is believed that these other references, whether they are considered individually or in combination, are no more pertinent than Nakano, et al.

In light of the above-discussed differences between Claims 1, 6 and 11 and the prior art, and because of the advantages associated with those differences, these claims patentably distinguish over the prior art and are allowable. Claims 2, 4, 5, 16 and 17 are dependent from Claim 1 and are allowable therewith; and Claims 7, 9, 10, 18 and 19 are dependent from Claim 6 and are allowable therewith. Also, Claims 12, 14, 15, 20 and 21 are dependent from, and are allowable with, Claim 11.

It is noted that the changes requested herein only emphasize differences between Claims 1, 6 and 11 and the prior art. For example, these claims presently describe the plurality of different direction scans, and the changes proposed herein only emphasize the way in which these scans are used. Moreover, the last Office Action is the first time that Nakano, et al. has been applied against the claims, and this is the first opportunity Applicants have had to respond to the rejection of the claims based on this reference. Accordingly, it is believed that entry of this Amendment is appropriate, and such entry is respectfully requested.

For the reasons advanced above, the Examiner is respectfully requested to enter this Amendment, to reconsider and to withdraw the rejections of Claims 1, 2, 4-7, 9-12 and 14-21, and to allow these claims.

Every effort has been made to place this application in condition for allowance, a notice of which is requested. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is asked to telephone the undersigned.

Respectfully Submitted,

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